F·A·A·M facility for airborne atmospheric measurements

FLIGHT FOLDER

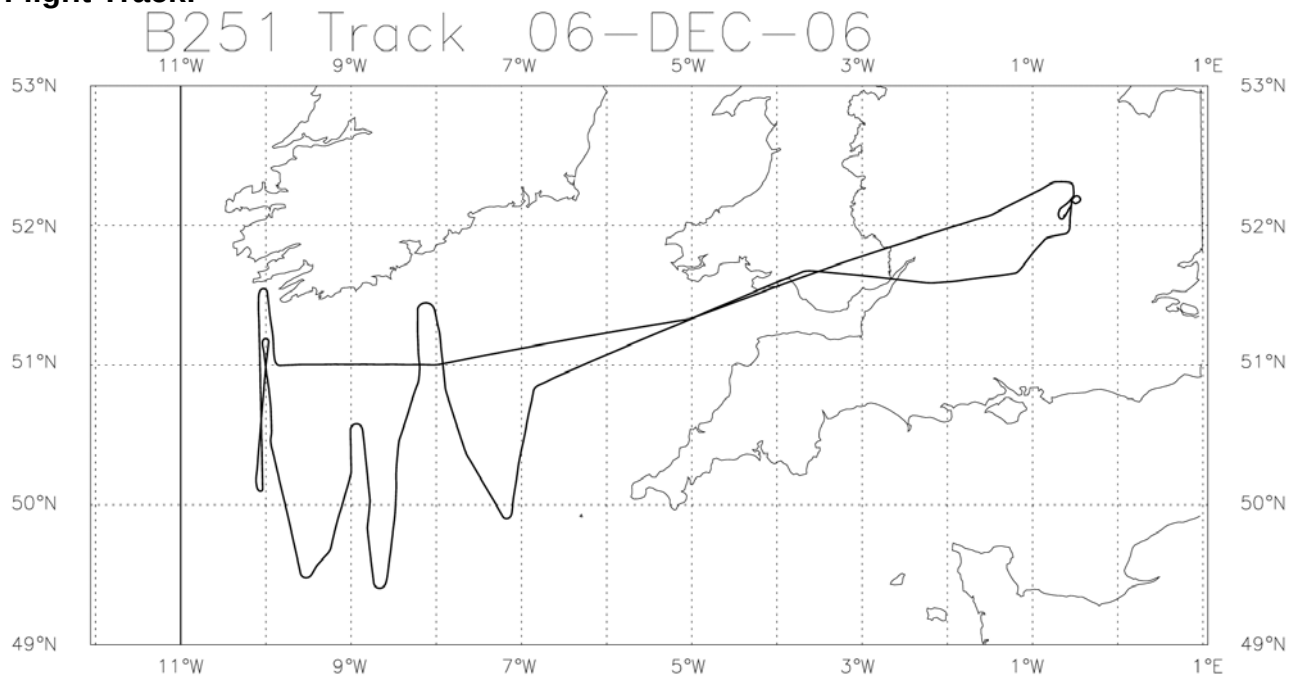
Flight No.:	B251
Date:	6 December 2006
Take Off	12:03:57
Landing:	17:12:37
Flight Time	5h08m40

Campaign: Mixed Phase Clouds

Operating Area: South West

POB	Position	Name	Institute
1	Captain	Alan Foster	Directflight
2	Co-pilot	Ian Ramsay-Rae	FAAM
3	CCM	Dawn Quinn	Directflight
4	Mission Scientist	Jim Haywood	Met Office
5	Flight Manager	Mo Smith	FAAM
6	Cloud Physics / CCM2	Kate Turnbull	FAAM
7	BBC Liaison	Ruth Purvis	FAAM
8	Air Experience	Sally Close	Met Office
9	Filming for “Inside Out”	Viveak Marwaha	BBC
10	Filming for “Inside Out”	Peter Cockcroft	BBC
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

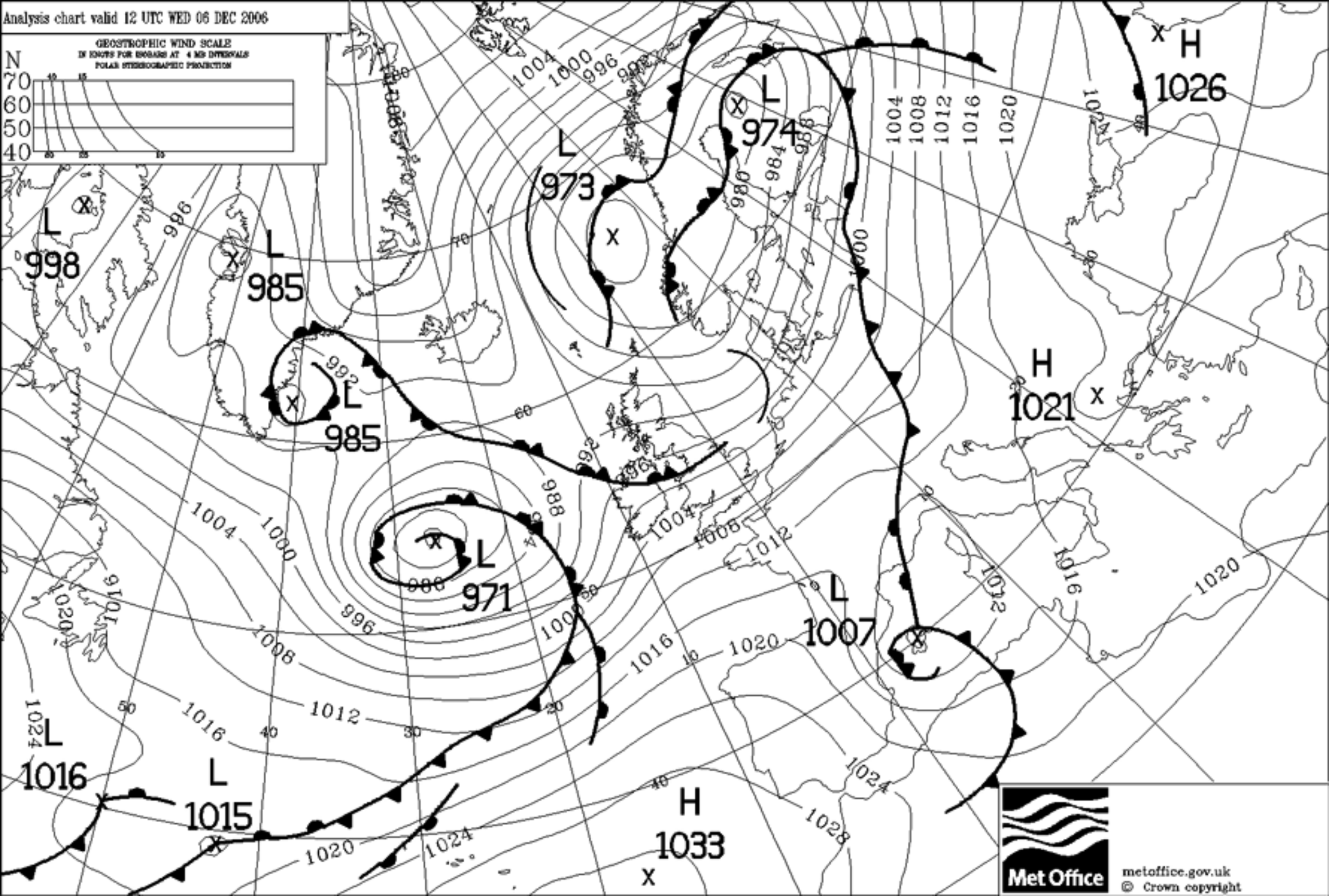
Flight Track:



FLIGHT SUMMARY

Flight No B251
Date: 06 Dec 2006
Project: WINTEX - Mixed Phase
Location: South of Ireland

Start Time	End Time	Event	Height (s)	Hdg	Comments
103307		Start-Up	0.69 kft	128	52'04.36N, 0'37.48W
113952		INU	0.68 kft	128	to Navigate
114832		Videos	0.68 kft	128	Start FFC & UFC
115253	115602	Orbit 1	0.69 kft	177	On ground for BBRs
120357		T/O	2.2 kft	315	Cranfield
121313		Video	10.0 kft	245	Switch to FFC & RFC
123136		Event	28.0 kft	263	Top of climb
124434		Heimann	28.0 kft	260	Cal 10-0C
131958		Videos	28.0 kft	275	Change Tapes
132732	133336	Profile 1	28.0 - 23.0 kft	335	
133530	135405	Profile 1	23.0 - 6.0 kft	197	Below cloud base
135636	141040	Profile 2	6.0 - 19.0 kft	340	
140700	141000	Run 1	15.0 kft	190	Approx Run 1 times
141040	141100	Profile 3	19.0 kft	351	
141527		Event	19.0 kft	187	
141533	141943	Profile 3	19.0 - 15.0 kft	187	
141944	143016	Run 2	15.0 kft	190	
143039	143439	Profile 4	12.0 kft	179	
143622	145138	Run 3	12.0 kft	019	
145205		Videos	12.0 kft	025	Change tapes
145326	145556	Profile 5	12.1 - 10.0 kft	180	
145556	151115	Run 4	10.0 kft	186	
151301	152350	Profile 6	10.0 - 0.75 kft	006	End @ 500' QNH 1006
152350	154121	Profile 7	0.75 - 20.0 kft	353	From 500'
154924	160408	Profile 8	20.0 - 5.1 kft	174	P8
160535	161807	Profile 9	5.1 - 20.0 kft	006	
161849	162320	Profile 9	20.0 - 25.0 kft	049	
162809		Videos	25.0 kft	061	End of tapes
162822		Heimann	25.0 kft	062	Cal -12 to -20C
171237		Land	0.61 kft	216	Cranfield
171914		Shutdown	0.60 kft	309	52'04.36N, 0'37.50W


Analysis chart valid 12 UTC WED 06 DEC 2006
GEOSTROPHIC WIND SCALE
IN KNOTS FOR 950MB AT 4 MB INTERVALS
POLAR STEREOGRAPHIC PROJECTION
N
70
60
50
40
L
998
L
985
L
985
L
973
L
974
L
971
L
1016
L
1015
L
1007
H
1026
H
1021
H
1033
Met Office
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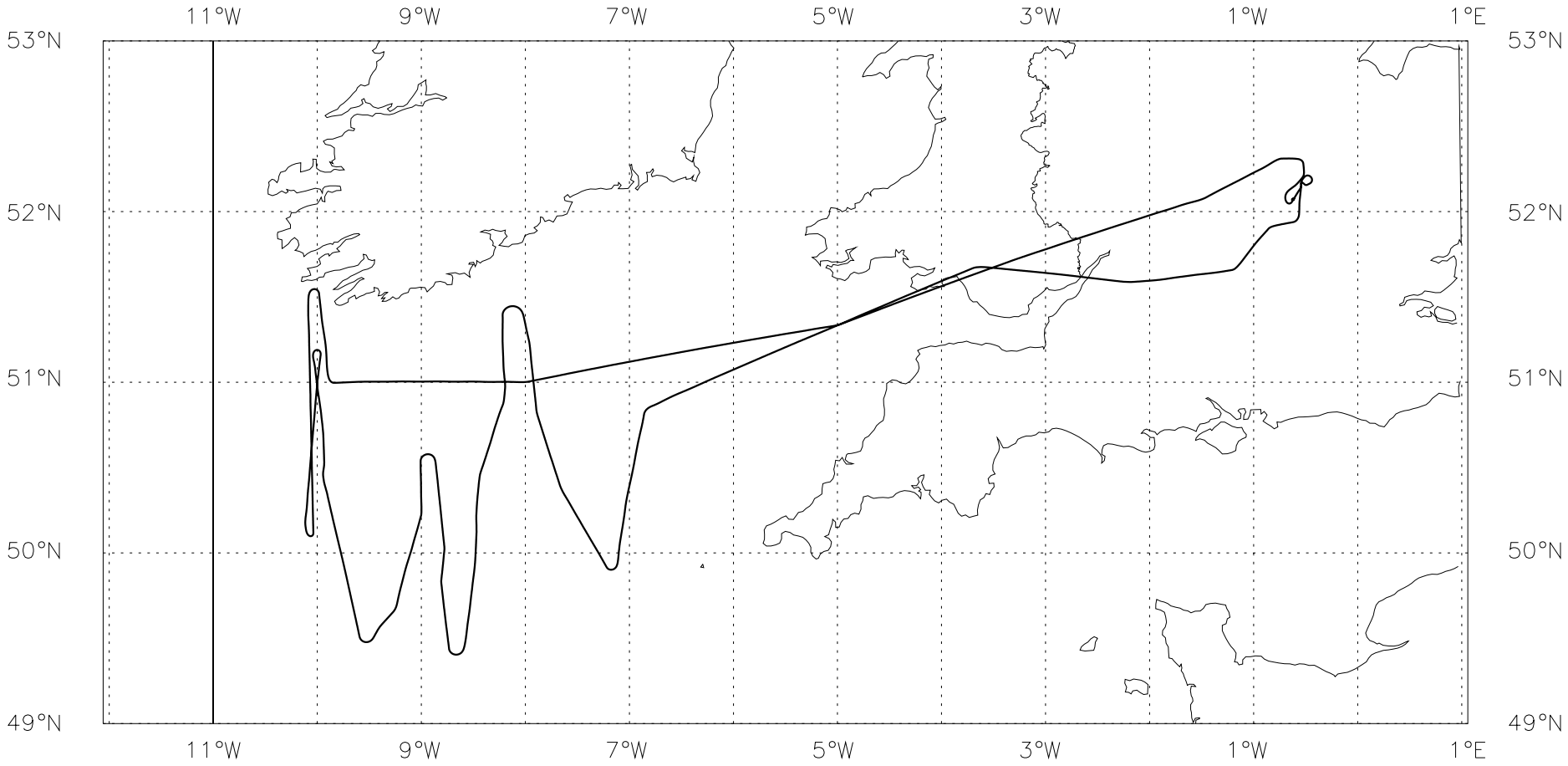
B251 Track 06-DEC-06



Sortie Brief: **WINTEX – mixed-phase layer cloud structure**

Flight no. B251 **Date: 06/12/2006**

Scientific Aims: The purpose of this sortie is to examine the distribution of supercooled liquid water in a medium-level stratiform cloud system and in particular, to examine the presence of supercooled layers at cloud-top level.

Weather conditions: Any stratiform medium-level cloud system over the SW Approaches or N.Sea. An absence of embedded convection is highly desirable.

Key measurements

- Johnson-Williams LWC and Nevzorov LWC/TWC. If possible, these should be zeroed whenever in clear air at any flight level.
- Cloud physics – normal operations. Ensure that time offsets between SEADAS, FFSSP and SID-1/2 PCs are noted. Ensure SID-2 data files saved periodically.
- Turbulence probe. Monitor the differential pressure measurements in order to observe the onset of possible icing. If icing is observed, descend out of cloud and/or below the freezing level until it clears.
- FWVS – to be operated if fitted.

Sortie Summary: Perform a number of straight/level legs along or across the mean wind direction at various levels within the cloud layer, together with sawtooth profiles in order to determine the vertical extent of supercooled liquid water.

Sortie Detail:

a) T+0 Take off and climb for transit to pre-defined operating area. Transit altitude as convenient but plan to arrive in the operational area at FL300 (50 min).
b) T+50 Profile descent from FL300 to FL150 (or -15 degC level or 1000ft below the base of a medium-level stratiform cloud layer, whichever is the lower) at 1000ft/min. Note cloud top and base altitudes. (15 min)
c) T+65 Perform a set of straight/level legs of 10 min duration, orientated along or across the mean wind direction (as convenient). One leg should be ~300ft below cloud top but aiming to stay within any supercooled liquid layer. Further legs should be flown in ice or mixed-phase regions at lower levels within the cloud layer. A minimum of 3 legs is desirable (45 mins).
d) T+110 Profile ascent 1000 ft/min from below cloud base to cloudtop+500ft (10min)
e) T+120 Perform sawtooth profile between altitudes of cloudtop+500ft and 1000ft below the lowest altitude at which liquid water is observed. Climbs/descents at 1000ft/min, straight/level segments of 1 min duration. Minimum 2 cycles of descent/climb. (20 min)
f) T+140 Repeat c) to e) as time permits.
g) T+275 Return transit (50 min)
h) T+325 Land.

Sortie Debrief

Flight Number: B251 Date: 6th December 2006

Sortie Objectives: To assess the performance of SID-2 cloud physics probe in mixed-phase clouds containing super-cooled water droplets and small ice crystals.

Operating area: Southwest approaches 49 - 51.5N, 8-10W.

Weather: Warm/occluded front orientated N-S approaching from the west with mid and low-level cloud.

Flight Patterns:
A 360 degree rotation "pirroutte" was for the purposes of testing the angular response of the upper broad-band radiometer. Cloud interference was considered to be negligible. Take off from Cranfield was at 12:00Z. Ascent to FL280. Transit to 51N, 10W. Humidity rose with proximity to approaching frontal system. Thin discontinuous layers of mid level cloud observed around FL150 observed on the eastern edge of the front with thicker and more convective cloud further west. Profile descent performed from FL280 to FL060 in northerly direction, interrupted at FL220 to turn south at 51.5N. Turrets of weak convective cloud observed with varying cloud top heights from FL120 to FL220. Several penetrations of super-cooled water clouds between FL200 and FL120. More continuous cloud cover below FL120. Did not reach cloud base on this descent. This was followed by a profile ascent from FL060 to FL190 in a N'erly direction.
A 3-minute run was made at FL190 (-24C) penetrating the highest convective turrets. Due to scarcity of clouds at FL190 a descent was made to FL150 (-15C) followed by a 12 minute run at that level in S'erly direction. Cloud was still discontinuous at this altitude. A descent was made to FL120 (-9C) and a run was made for 15 minutes in N'erly direction, clouds still not completely continuous, some deviations made to intercept lines of cloud. A descent was made to FL100 (-6C) where the cloud was moreorless continuous and a 15 minute run made in a S'erly direction.
A series of sawtooths were then performed. This started with a descent from FL100 to 500ft, followed by ascent to FL200, descent to FL050 and ascent to FL200. Freezing level was around FL060, cloud base was around 2000ft. Completely overcast with light drizzle and poor visability near the surface. Generally high cloud cover up to FL120 and then variable cloud above, up to around FL200.

Summary:
A reasonably successful flight for sampling of mixed phase clouds, including super-cooled water and small ice. SID-2 seemed to be reading reasonable concentrations. SID-2 asphericity output was not specifically monitored / interpreted during the flight.

Problems:
Failure of temperature readings from de-iced true temp. Several attempts to rectify this during flight with variable success. 2D-C was recording signals / noise in clear air, though in cloud it was appeared to be producing reasonable output. Cursor problems with mission scientist laptop. Turbulence probes frequently iced up, after encountering supercooled water clouds. CIP wasn't working.

Mission Scientist's Log

Flight No **B**251 Date 6th December 2006 Page 1 of 4

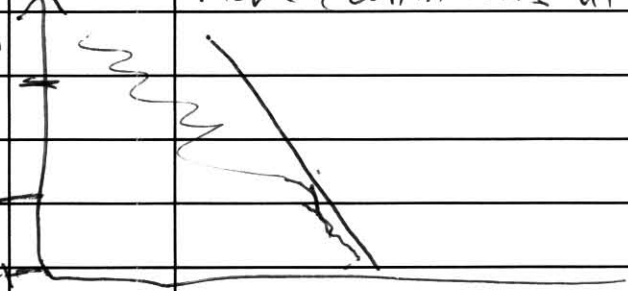
GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
					Wintex flight.
					Warm / occluded front to W of
					UK. Investigation of supercooled
					water / ice.
					Head to operating point 50N, 10W.
					Pirouette on old runway.
115253	StPir				Start pirouette.
					Clear skies above. Should be good.
115602	EndPir				End pirouette.
					Only very little cloud < 5%
					during pirouette - should be
					'clean'.
					Good visibility ~ 20 miles.
					A little cloud ~ 5000ft.
					Cloud increasing to the west.
					-10 FL100
					-12.5 FL120
					-15.0 FL130 Climb in
					-17.5 FL140 Daventry
					-20.0 FL150 corridor.
					-22.5 FL160
					-25 FL170
					-27.5 FL180
1230					Aircraft above shows no contrailing....
1248					Mid-level cloud evident ahead to W.

Mission Scientist's Log

IR leading edge

Flight No B251 Date 6th December 2006 Page 2 of 4

FAAM © 2004

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
12:52:30					FL280, T=-45°C, Td=-57.78C.
12:58					" T=-45°C, Td= -49C.
13:12		FL280	270	51N 8.3W	↑Moisture increasing here.
					mid level cloud below, v thin layers
		Convective clouds bubbling up above this			
132730	P1	FL280	270 - 350	51N 10W	Turning North and starting profile descent to FL220
133000					Convective tops ahead with 28000ft cloud top
133336	P1	FL230		51.5N 10W	Interrupt to turn South
133530	Resume P1	FL230		"	Resume on southerly heading
					-25°C @ 19 kFt
134130		FL175		50.8 10W	Entered cloud Liquid icing & observed in water
					-15°C @ 15.5kFt
1345					Cloud pass at 13kFt
					Lots of Liquid recorded
1347		FL120			Cloud again
1350		FL100			Thicker more continuous cloud
135410	End P1	FL060	South		0°C at FL0
135636	start P2	FL060	North South		More continuous at FL070
					

* problems with temperatures 142600 onwards

Mission Scientist's Log

Flight No B.251..... Date 6th December 2006 Page 3 of 4

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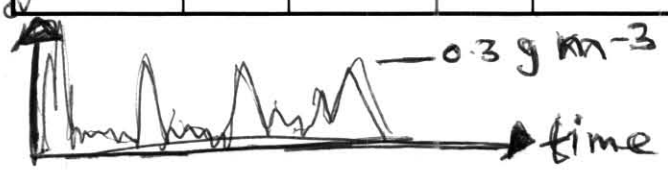
GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
14 05		FL140	N	50.6 low	Coming out of cloud at
14 12	End P2	FL190	N	51.1 low	-15°C at 16kft
14 26	Run 1	FL190	S	50.9 low	-24°C convective to
14 15 33	Start P3	FL190	S	50.8 low	penetration
14 1600	P3	FL180	S	50.7 low	cloud -23°C
14 1944	End P3 R2	FL150	S	50.5 low	-15°C quite a lot of cloud
					about intermittent penetrations
14 30 39	P4	FL150	S		Dropping to FL120 because
					cloud looks too scrappy and intermittent here
					head a little east then north because line of cloud observed to left
	End P4	FL120	S		Turn east then north
14 36 22	Start R3	FL120	N		Deviating to hit a line of cloud
14 51 38	End R3	FL120	N		ahead in cloud at -9°C
14 53 26	P5	FL120-FL100	S		descending hoping for more
14 55 56	R4	FL100	S	50.5N 9W	continuous cloud. -6°C
15 11 15	End R4	FL100	S	49.5 8.6 W	but quite tenuous
15 13 01	P6	FL100	N		cloud base at ~ 2000ft
15 23 50	End P6	1kft	N		very poor visibility at
15 23 50	P7	100ft	N		surface - cloud base
					Surface temp ~ 10°C
15 30 00					ice appearing between
					FL060 and FL070 cloud tops
15 41 21	End P7	FL200	S		around FL150
15 49 24	P8	FL200	S		* SID-2 concentrations are
		-FL050			looking reasonable

Nevzorov Total water



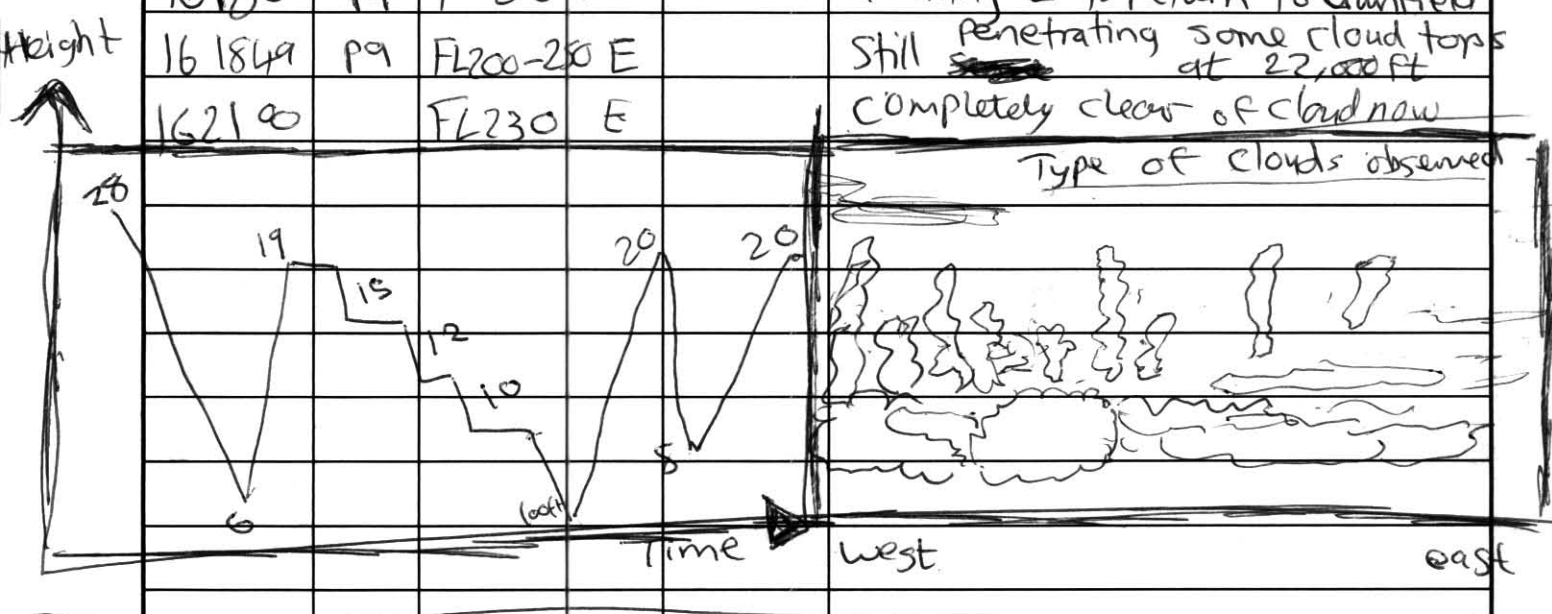
very spiky LWC and TWC

[redacted] concentrations [redacted] looking reasonable

Mission Scientist's Log

Flight No **B**251 Date 6 ~~December~~ 2006 Page 4 of 4

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
155000	P8	FL180			high cirrus to S and SW
					Bubbly clouds of varying
					cloud top all around with
					more continuous / unbroken cloud below.
					Look like liquid on the tops
					with tops ~ 15000ft
					Turbulence probes iced up
					this has occurred frequently through flight
160408	End P8	FL050	S		Just below cloud
160535	P9	FL050	N		Turning N for last saw tooth segment.
161100	P9	FL100	N		Nice transition from snow to
					ice columns observed on 2D-C
161807	Interrupt End P9	FL200	N		Turning E to return to Cranfield
161849	P9	FL200-250	E		Still penetrating some cloud tops at 22,000ft
162100		FL230	E		completely clear of cloud now
					Type of clouds observed
1623	End P9	FL250	E		



CLOUD PHYSICS LOG Flight B251

Date: 06/12/06	Operator: KFT	DRS Time: 10:01:00	DAU1 Time: +0	DAU2 Time: +0	DAU3 Time: +0	Aux1 Time: +0	Aux2 Time: +0	Page 1 of 1

G.M.T	PCASP		FFSSP	SID1	SID2	2D2-C		2D2-P		CIP25			CIP100			Habit	Remarks
	Conc/cc	Mean R	Block TX	Count	Count	Conc/L	Max size	Conc/m3	Max size	Conc m3	Max size	LWC	Conc m3	Max size	LWC		
12:20							NOISY										All heaters on. 2DC rearm 1 8
12:30:00	2.22	0.08	6	0	0	148	50	1708	0				0.11				FL280 Noise on 2DC and 2DP
12:40:00	2.96	0.12	6	10	0	412	50	12275	0				0				FL280 Noise on 2DC and 2DP
12:50:00	2.22	0.10	6	1	0	288	50	92	0				0				FL280 Noise on 2DC and 2DP
13:00:00	1.48	0.06	7	0	0	206	50	0	0				0				FL280 Noise on 2DC and 2DP
13:10:00	1.48	0.05	7	8	0	240	50	0	0				0				FL280 Noise on 2DC and 2DP
13:15:00																	New SEADAS file B251b.dat started
13:20:00	2.96	0.09	7	0	0	1030	50	0	0								FL280 Noise on 2DC and 2DP Rearm 1 1
13:28:30	3.70	0.11	7	0	20	57	50	0	0				0				FL270
13:29:45	5.19	0.07	7	0	10	70	50	0	0				0				FL260
13:30:45	5.19	0.07	7	0	50	123.5	50	0	0				0				FL250
13:32:10	0.74	0.09	7	0	20	109	50	0	0				0				FL240
13:33:25	1.48	0.08	7	0	0	148	50	0	0				0				FL230
13:35:33	1.48	0.05	8	0	200	184	50	0	0				0				Fl230 PROFILE RECOMMENCED
13:36:40	2.89	0.07	8	0	0	69	50	0	0				0				Fl220
13:37:45	3.7	0.06	8	0	50	65	50	6733	0				0				Fl210
13:39:00	2.22	0.07	8	0	0	43	50	43141	0				0				Fl200 Noise on 2dc 2dp, pcasp flow low
13:40:20	2.22	0.07	8	0	0	2997	50	189999	0				0				FL190
13:41;20	1.48	0.07	8	0	80	135	50	148850	0				0				FL180
13:43:00	2.96	0.07	22	0	20	871	50	7433	0				0				Fl160
13:44:09	10.93	0.07	22	0	500	194	50	6208	0				0				Fl150
13:44:59	14.08	0.09	22	2000	8000	384	50	0	0				0				Fl140
13:46:10	20.01	0.08	24	2	2000	273	50	9950	0				0				Fl130
13:47:15	8.89	0.08	24	0	0	336	50	3375	0				0				Fl120
13:48:30	9.63	9.08	27	10	50	152	50	98766	0				0				Fl110
13:49:35	14.08	0.38	32	1000	900	937	725	129999	0				0			8,5	Fl100
13:51:22	4.44	0.24	37	200	100	125	500	120000	0				0			8, 5	Fl090
13:52;30	11.85	0.15	43	1000	50	181	725	75000	400				0			8	Fl070 Ice and water
13:54:10	72.	0.09	53	100	20	5.5	625	2250000	0				0			8,1	FL060 mostly water
13:56:35	31	0.26	65	500	100	85	625	86000	0				0			8, 1	FL060 start P2 mostly water some DZ
13:57:42	4.44	0.54	74	100	10	59	575	130000	0				0			8,5	Fl070
13:58:45	39.6	0.57	83	1000	40	180	175	79300	0				0			8	Fl080
13:59:55	22.89	0.54	95	1000	40	361	675	117075	0				0			8, 5	FL090
14:01:58	37.84	0.42	115	500	20	304	800	84650	800				0			8,5	FL100
14:02:05	11.12	0.76	128	1000	100	342	375	11416	0				0			8,5,4	FL110
14:03:15	2.96	0.26	147	1000	1000	576	50	14750	0				0			8,5,4	FL120
14:04:20	244	0.66	168	1000	500	332	375	12841	0				0			8	FL130

CLOUD PHYSICS LOG Flight B251

Date: 06/12/06	Operator: KFT	DRS Time: 10:01:00	DAU1 Time: +0	DAU2 Time: +0	DAU3 Time: +0	Aux1 Time: +0	Aux2 Time: +0	Page 2 of 2

G.M.T	PCASP		FFSSP	SID1	SID2	2D2-C		2D2-P		CIP25			CIP100			Habit	Remarks
	Conc/cc	Mean R	Block TX	Count	Count	Conc/L	Max size	Conc/m3	Max size	Conc m3	Max size	LWC	Conc m3	Max size	LWC		
14:05:14	7.41	0.12	182	0	0	64.5	50	0	0				0			8	FL140
14:06:25	5.92	0.10	182	8	0	183	50	0	0				0				FL150
14:07:15	4.44	0.09	182	1000	200	1054	175	51416	0				0			8, 12	Fl160
14:08:13	1.48	0.13	195	0	0	139	50	0	400				0			8, 12	FL170
14:09:15	1.48	0.17	195	0	0	81	50	0	0				0			8	FL180
14:11:25	1.48	0.17	195	0	0	93.5	50	0	0				0				FL190 END P2
14:13:00	1.48	0.08	196	0	0	120	50	0	0				0				FL190
14:14:30	1265	0.61	205	2000	2000	1107	325	61191	400				0			8, 12	FL190 CLOUD
14:16:30	286	0.77	216	5000	800	2571	425	24000	1600				0			8, 12	FL180
14:18:30	5.93	0.22	229	1000	80	245	100	225	400				0			4,8,5	FL160
14:19:35	14.08	0.12	232	30	8	305	375	61508	1600				0			8	FL150 START RUN
14:22:00	2.22	0.11	242	200	1000	148	50	333	0				0			8	FL150
14:24:00	7.41	0.11	244	2	0	171	50	0	0				0			8	Noise on 2DC
14:26:00	3.7	0.07	259	0	100	67	50	0	0				0			8, 5	Some noise on 2DC
14:28:00	5.93	0.08	259	0	0	189	50	0	0				0				Noise on 2DC
14:30:00	8.89	0.07	259	0	50	134	50	0	0				0				Some noise on 2DC start Profile4
14:31:55	8.89	0.09	259	0	0	72	50	0	0				0				FL140 Some noise on 2DC
14:33:20	6.67	0.08	259	0	80	218	50	0	0				0				FL130 Noise on 2DC
14:34:25	12.82	0.10	259	5	0	570	50	0	0				0				FL120 Noise on 2DC
14:36:00	5.93	0.09	259	0	0	68	50	0	0				0				Noise on 2DC start run3 at FL120
14:38:00	33.37	0.26	260	2000	500	1627	550	116	1600				0			8	Fl120 noise on 2dc
14:40:00	142	0.69	296	1000	100	282	575	8250	2400				0			8,5,	
14:42:00	6.45	0.27	339	1000	1000	80	50	466	1600				0			8,	
14:44:00	35.65	0.55	350	1000	800	404	75	8	1600				0			8	Some noise on 2dc
14:46:00	18.53	0.53	368	500	200	123	50	1350	1600				0			8,5	Some noise on 2dc
14:48:00	18.56	0.53	389	1000	800	119	50	1466	1200				0			8,5	Some noise on 2dc
14:50:00	23.51	0.61	404	1000	500	481	50	13266	1200				0			8	Some noise on 2dc
14:51:38	21.52	0.52	410	1000	800	891	200	591	1200				0			8	Some noise on 2dc end run3
14:52:30	1.78	0.29	417	800	800	1427	50	18283	1200				0			8,5	Start profile
14:54:50	2.67	0.23	424	200	500	663	50	6391	1600				0			8	FL110
14:55:45	1.56	0.17	426	200	100	884	125	10916	1600				0			8,5	FL100 END PROFILE
14:58:00	3.93	0.28	435	200	100	275	675	15783	1200				0			5,4	
15:00:00	9.34	0.44	450	100	50	195	725	10700	3200				0			5,4	
15:02:00	34.25	0.56	459	100	50	961	375	6278	1200				0			5,4	Some noise on 2dc
15:04:00	4.15	0.19	471	80	200	418	800	18758	1200				0			5,4	Some noise on 2dc
15:06:00	11.26	0.47	492	1000	800	399	300	10775	1200				0			5,4,8	Some noise on 2dc
15:08:00	9.19	0.26	523	1000	800	221	125	200	1200				0			5,4	Some 12 too Noise on 2dc
15:10:00	8.30	0.62	546	1000	400	424	275	3700	800				0			5,8	Some noise on 2dc
15:11:16	8.15	0.14	551	100	90	86.5	50	441	400				0			5	Some noise on 2dc End of Run
15:13:05	18.09	0.42	559	2000	1000	402	50	1383	800				0			5	Start of Profile 5
15:14:10	14.60	0.10	575	40	10	604	200	9083	800				0			5,8	FL090
15:16:25	11.8	0.44	582	800	80	238	250	1691	6400				0			8,2	FL070
15:17:49	47.92	0.48	594	800	80	712	50	10175	800				0			8,1	FL060 More water
15:19:00	89.33	0.53	609	500	80	518	175	791	1600				0			8,1	FL050
15:20:00	27.83	0.39	614	2000	1000	330	175	808	2400				0			1	FL040
15:21:05	125.8	0.25	646	200	50	922	50	2008	3200				0			1	FL030

CLOUD PHYSICS LOG Flight B251

Date: 06/12/06	Operator: KFT	DRS Time: 10:01:00	DAU1 Time: +0	DAU2 Time: +0	DAU3 Time: +0	Aux1 Time: +0	Aux2 Time: +0	Page 3 of 3

G.M.T	PCASP		FFSSP	SID1	SID2	2D2-C		2D2-P		CIP25			CIP100			Habit	Remarks
	Conc/cc	Mean R	Block TX	Count	Count	Conc/L	Max size	Conc/m3	Max size	Conc m3	Max size	LWC	Conc m3	Max size	LWC		
15:22:15	69	0.15	652	200	20	493	50	1741	2400							1	FL020
15:23:10	84	0.15	655	100	20	778	50	1033	1600				0			1	FL010
15:24:10	98	0.21	658	100	40	488	225	7816	1600				0			1	FL010
15:25:06	66	0.18	662	1000	1000	440	50	1075	1600				0			1	FL020 Some noise on 2DC
15:26:05	43	0.20	675	80	50	662	50	1516	3200				0			1	FL030 Some noise on 2DC
15:27:20	32	0.40	686	100	50	284	125	3308	1200				0			1	FL040 Some noise on 2DC
15:28:10	15	0.38	695	100	100	250	50	2166	800				0			1	FL050 Some noise on 2DC
15:29:00	88	0.37	702	100	20	708	525	3000	6400				0			4,5,8	FL060 Some noise on 2DC
15:29:55	1.11	0.19	707	500	10											4,5,8	FL070 Some noise on 2DC
15:31:00	26	0.53	713	1000	100	641	550	10566	1600				0			4,5,8	FL080 Some noise on 2DC
15:31:30	82	0.56	721	800	80	679	300	24000	1200				0			5,4	FL090 Some noise on 2DC
15:32:30	194	0.58	735	800	100	282	375	18000	1200				0			5,4	FL100 Some noise on 2DC
15:33:20	55	0.46	746	800	100	270	50	941	1600				0			8	Fl110 Some noise on 2DC
15:35:05	17	0.33	756	1000	1000	1129	125	7716	1600				0			8	FL130 Some noise on 2DC
15:35:55	86	0.25	781	2000	1000	527	450	6483	1200				0			8	FL140 Some noise on 2DC
15:36:48	187	0.54	792	200	80	156	50	0	0				0				FL150 Some noise on 2DC
15:37:46	2.81	0.13	792	80	5	113	50	2000	1600				0			8	FL160 Some noise on 2DC
15:38:35	103	0.63	797	80	100	780	425	6673	1600				0			8	FL170 Some noise on 2DC
15:39:34	2.96	0.19	807	0	0	65	50	0	0				0				FL180 Some noise on 2DC
15:40:20	1.33	0.11	807	0	0	213	50	0	0				0				FL190 Some noise on 2DC
15:41:15	2.15	0.12	807	500	100	262	50	13000	1600				0			5	FL200 end of profile Some noise on 2DC
15:45:00	1.85	0.09	814	0	0	120	50	0	0				0				FL200 Some noise on 2DC
15:48:00	1.19	0.08	818	5	1	59	50	233	800				0				FL200 Some noise on 2DC
15:49:26	1.62	0.08	818	0	0	131	50	0	0				0				FL200 Some noise on 2DC Start P6
15:50:20	1.63	0.07	818	0	0	218	50	0	0				0				FL190
15:51:35	3.04	0.08	818	0	0	122	50	0	0				0				FL180
15:52:30	2.59	0.08	818	0	0	215	50	0	0				0				FL170
15:53:30	3.93	0.08	818	0	0	290	50	0	0								FL160
15:54:30	163	0.62	827	1000	800	453	500	2766	1200				0			8	FL150 Some noise on 2DC
15:55:30	6.15	0.08	827	10	1	786	50	0	0				0				FL140 Some noise on 2DC
15:56:30	9.33	0.08	827	0	0	797	50	0	0				0				FL130 Some noise on 2DC
15:57:30	5.62	0.32	829	200	10	282	300	11000	1600				0			8	FL120 Some noise on 2DC
15:58:27	358	0.56	837	100	10	874	450	11100	1600				0			8	FL110 Some noise on 2DC
15:59:25	8	0.58	847	200	80	283	700	2200	2400				0			8	FL100 Some noise on 2DC
16:00:30	2.22	0.21	852	100	10	178	300	4308	400				0			5,8	FL090 Some noise on 2DC
16:01:25	28	0.68	853	400	80	124	675	6791	2400				0			8	FL080 Some noise on 2DC
16:02:13	72	0.61	856	800	80	285	250	4066	3200				0			8	FL070 Some noise on 2DC
16:03:10	22	0.51	861	1000	200	500	175	875	4000				0			8,1	FL060 Some noise on 2DC
16:04:00	7	0.53	869	800	800	34	650	459	6400				0			8,1	FL050 End of profile
16:05:35	7	0.42	873	2000	800	681	200	1875	3200				0			8	FL050 Start of profile
16:06:25	35	0.34	882	1000	100	1445	125	625	400				0			8	FL060 Some noise on 2DC
16:07:25	2.24	0.57	887	200	80	417	75	566	400				0			1,8	FL070 Some noise on 2DC
16:08:10	0.44	0.15	889	10	1	942	50	225	2400				0			5,8	FL080 Some noise on 2DC
16:09:10	16.4	0.45	891	50	5	150	400	950	1600				0			5	FL090 Some noise on 2DC
16:09:50	6.67	0.11	891	10	1	400	50	791	1200				0			8, 11	FL100 Some noise on 2DC
16:11:30	12.3	0.39	908	2000	1000	695	75	33	2400				0			8, 11	FL120 Some noise on 2DC

CLOUD PHYSICS LOG Flight B251

Date: 06/12/06	Operator: KFT	DRS Time: 10:01:00	DAU1 Time: +0	DAU2 Time: +0	DAU3 Time: +0	Aux1 Time: +0	Aux2 Time: +0	Page 4 of 4

G.M.T	PCASP		FFSSP	SID1	SID2	2D2-C		2D2-P		CIP25			CIP100			Habit	Remarks
	Conc/cc	Mean R	Block TX	Count	Count	Conc/L	Max size	Conc/m3	Max size	Conc m3	Max size	LWC	Conc m3	Max size	LWC		
16:12:16	25.8	0.34	922	3000	1000	1180	100	75	800				0			8, 11	Fl130 Some noise on 2DC
16:13:00	5.70	0.10	932	0	0	194	50	0	0				0				Fl140 Some noise on 2DC
16:14:00	4	0.25	933	0	0	88	50	0	0				0				FL150 Some noise on 2DC
16:14:40	1.63	0.22	943	800	80	208	50	0	0				0				Fl160 Some noise on 2DC
16:16:18	0.89	0.07	949	100	400	301	50	0	0				0				Fl180 Some noise on 2DC
16:18:05	552	0.62	961	400	80	76	75	0	1600				0				Fl200 Some noise on 2DC
16:19:40	1.93	0.07	962	0	0	89	50	0	0				0				Fl210 Some noise on 2DC
16:20:32	1.33	0.07	963	0	0	106	50	0	0				0				FL220 Some noise on 2DC
16:21:20	1.4	0.09	963	0	0	222	50	0	0				0				FL230 Some noise on 2DC
16:22:15	1.63	0.07	963	0	0	247	50	0	0				0				Fl240 Some noise on 2DC
16:23:20	1.93	0.07	963	0	0	184	50	0	0				0				FL250 Some noise on 2DC

PCASP Flowrate = 1.8 CC/Sec
2DC data noisy throughout
2DP data noisy at higher levels
PCASP flow low at higher levels

Revision date: 08/12/2006 11:33 AM

CLOUD PHYSICS PROCESSING LOG

Flight number: **B251** **T/O:** 12:03:57
Date of flight: 06/12/06 **Land:** 17:12:37

A) **FFSSP PROCESSING**		Sent to MP/PB to process
Processing Stage	Done?	Comments
1) Transfer *.txt files from DVD to processing PC	Y	
Bnnn_FFSSP_hh.txt for each hour of data		**hh =**
Bnnn_FFSSP_HVMS.txt		**Last sec processed =**
2) FTP the files (ascii) from the PC to directory PMSDATA: on FLOODS	N	**File size =**
3) FLOODS> **RUN MRFB:[PMS.FAST_FSSP]FSSP_EXTRACT_TAS**		Use time just before/after take-off/landing. If T/O /landing just after/before the hour, ensure start/end time is before/after the hour if there is an FFSSP_hh.txt file for that hour.
a) Flight number: **Bnnn**		
b) Path name: **MFDDATA:Bnnn_MFDX**		
c) Output directory: **PMSDATA:**		
d) Start time: *0 if unknown (see comment box)*		
e) End time: *240000 if unknown*		
4) FLOODS> **RUN MRFB:[PMS.FAST_FSSP]FFSSP_PROCESS_TXT**		
a) Flight number: **Bnnn**		
b) Directory: **PMSDATA:**		**Total glitches =**
c) TAS in processing: **Y**		**Sec file written ok?**
d) Vel threshold (clicks) **0**		
e) Calibration file: *Use the most recent calibration file.* Format FFSSP_CALddmmyyyy.txt Calibration files to be stored in MRFB:[PMS.FAST_FSSP]		**Note calibration file used**
f) Adjust FFSSP time **Y/N**		Yes only if gross errors occur in FFSSP time eg; ~ 1hour
g) If Y, enter value to add to data time (seconds)		
5) FLOODS> **WAVE**		Use PVWAVE for this section
a) WAVE> **write_procffssp_to_m5,'pmsdata:Bnnn_procffssp.dat', 'mfddata:Bnnn_mfdX','pmsdata:Bnnn_m5procffssp',/auto**		**Note time correction applied to FFSSP by /auto =**
b) WAVE> **exit**		
6) FLOODS> **MODIFY**		
a) Modifying datasets: **pmsdata:Bnnn_m5procffssp**		**Input file size =**
b) Dataset: **mfddata:Bnnn_mfdX**		**M5 output file size =**
c) New dataset: **mfddata:Bnnn_mfdY (y=x+1)**		
d) Parameter description file: *leave blank to use default*		
7) CHECKS:		
i). Are FFSSP and JW/Nevzorov LWC synchronized in time? *In flight_plot, parameters* *JW LWC para 535* *Nevzorov LWC para 602* *FFSSP LWC para 1202*		**Synchronized?**
ii). If not, repeat from step 5b replacing /auto with **addt=x** which adds x+20 secs to FFSSP time.		

CLOUD PHYSICS PROCESSING LOG

Flight number: **B251**
Date of Flight: 06/12/06

B) 2D PROCESSING		REPROCESS +1hr
Processing Stage	Done?	Comments
1) Transfer Bnnn.dat file from CD/DVD to PC	Y	
2) Zip up file on PC (Bnnn.zip)	Y	
3) FTP the zipped file (binary) from the PC to the directory SEADAS_DATA:[SEADAS_DATA] on FLOODS	Y	Size of Bnnn.zip = 55295
4) Log on to FLOODS		
5) Unzip SEADAS_DATA:[SEADAS_DATA]Bnnn.zip	Y	**Size of Bnnn.dat = 668435**
6) FLOODS> **WAVE** WAVE> **CONVERT_SEADAS_FILE** a) Input file: **SEADAS_DATA:[SEADAS_DATA]Bnnn.dat** b) Output file: **SEADAS_DATA:[SEADAS_DATA]Bnnn_seadas.dat** WAVE> **exit**		Use PVWAVE for this section **Blocks read = 94176** **Blocks written = 94176** **Bad reads = 0**
7) FLOODS> **RUN MRFB:[PMS.SEADAS]READM200_FILE** a) Default directory: **PMSDATA:** b) Flight number: **Bnnn** c) Disk file name: **SEADAS_DATA:[SEADAS_DATA]Bnnn_seadas.dat** d) Comment string: e) Start time: *0 if unknown (T/O – 5 min)* f) End time: *240000 if unknown (Land + 5 min)* g) Read 2DC: **Y** h) Read 2DP: **Y** i) Secondary data: **Y** j) FSP-SYNC: **Y** k) cmd.str: **Y** l) Auto time correction: **N** m) Full length secondary:**N**		**Start = 115700** **End = 162500** Ignore error message scroll (vestigial error from tapes) **Are FRW, FSP, IMB, PCA,SEC files in PMSDATA? Are they non-zero in size?**
8) FLOODS> **WAVE** i). WAVE> **imagedisplay** a) 2D directory name: **PMSDATA:** b) Flight number: **Bnnn** c) File generation no: **0** d) Time from IWC plot: **N** e) Select probe: (**1**) 2DC (**2**) 2DP f) Start time: *As in 7e above* g) End time: *As in 7f above* h) Time interval (sec): **5** recommended (0 for all images) ii). WAVE> **auto_image** a) 2D directory name: **PMSDATA:** b) Flight number: **Bnnn** c) Enter date: **YYYYMMDD** d) Enter start time: *0 if unknown (T/O – 1 min)* e) Enter end time: *240000 if unknown (Land – 1 min)* f) Enter time interval (sec) between successive imaged blocks: **10** iii). WAVE> **exit** to create files iv). FTP ascii *.PS files from PMSDATA: to PC v). Load each into Ghostview or other pdf-converter vi). Output as pdf file (720 dpi resolution), appending name prefix of **CORE-CLOUD-PHY**_ to converted files	Y **In 2 parts**	2D image display and printing Must be done from FLOODS itself. **Note any problems with images** **Noise on 2DC at all altitudes** **Noise on 2DP at high altitude** Prepare imagery for Core data From own PC again **Start = 131500** **End = 161500** FAAM_YYYYMMDD_R0_ Bnnn_2Dx-images.ps Notes on this in instructions

9) FLOODS> **RUN MRFB:[PMS.SPEC2D.AUTO]PROCESS2D_AUTO** a) Flight number: **Bnnn** b) Directory: **PMSDATA:** c) File generation: *Hit enter* d) Time correction: *Time offset of the 2D data* e) TAS: **Y** f) MFD directory: **MFDDATA:Bnnn_MFDX** g) Probe number: (**1**) 2DC (**2**) 2DP (**0**) Both *0 unless either probe known to be faulty* h) Start time: *0 if unknown (T/O + 30sec)* i) End time: *240000 if unknown (Land – 30sec)* j) Nominal averaging: **0.2** seconds for conversion to M5 k) Particle type 2DC: **8** if known to be in ice cloud **11** if known to be in water cloud l) Particle type 2DP: **8** if known to be in mixed-phase **8** if unknown m) Coefficient choice: **2** n) Output root filename: **PMSDATA:Bnnn_PROC2D**	Y	NB. an error message may appear, floating point exception, rerun and use time quoted in error message, repeat until successful. **X =** **Start =** 131500 **End =** 161500 **Time data processed to =** 161500.4 **2dproc files present?** Y *.2dc, *.2dp and *.dat
10) FLOODS> **WAVE** i) WAVE> **WRITE_PROC2D_TO_M5, 'PMSDATA:BNNN_PROC2D.DAT', 'PMSDATA:BNNN_M5PROC2D'** ii). **exit**	**Y**	Use PVWAVE for this section Error message about HDDR file should be ignored. **Records = 21861, 178**
11) FLOODS> **MODIFY** a) Modifying datasets: **pmsdata:Bnnn_m5proc2D** b) Dataset: **mfddata:Bnnn_mfdX** c) New dataset: **mfddata:Bnnn_mfdY** d) Parameter description file: leave blank to use default	**Y**	**X = A** **Y = (X+1) = B**
12) CHECKS: Are 2DC/2DP IWC of comparable magnitude and well-correlated with Nevzorov TWC? *In flight_plot, parameters* *Nevzerov TWC para 605* *2DC IWC para 1302* *2DP IWC para 1312*	**Y**	**Correlated?**

CLOUD PHYSICS PROCESSING LOG

Flight number: **B251**
Date of Flight: 06/12/06

C) PCASP PROCESSING		
Processing Stage	Done?	Comments
1) Complete stage 7) in 2D processing Ensures Bnnn_FSP.DAT containing raw PCASP data is written to directory PMSDATA:	Y	
2) FLOODS> **RUN MRFB:[PMS.PCASP]PROCPCASP_NEW**	Y	
a) Flight number: **Bnnn** b) File name: **PMSDATA:Bnnn_FSP.DAT** c) Root output name: **PMSDATA:Bnnn_PROCPCASP** Produces PMSDATA:Bnnn_PROCPCASP.DAT (binary) PMSDATA:Bnnn_PROCPCASP.OUT (ascii) d) Minimum size channel: *default = 1* *If smallest size channel are known to be noisy the value of the highest noise free channel to be entered here* e) Calibration volume flow rate: *Use the most recent value. 1.8ccs^{-1}* *Calibration files to be stored in **Exeter*** *Entering zero gives default value = 1.0 cm^{3}s^{-1}* f) Time correction: *Same value as used in 2D processing stage 9d* g) Start time: *0 if unknown* h) End time: *240000 if unknown*		**Min size = 1** **Vol flow rate =** 131500 New seadas file started 162300 Instr turned off
3) FLOODS> **WAVE**	Y	Use PVWAVE for this section
i).WAVE> **write_procpcasp_to_m5,** **'pmsdata:Bnnn_procpcasp.dat',** **'pmsdata:Bnnn_m5procpcasp'** ii). WAVE> **exit**		
4) FLOODS> **MODIFY**	Y	
a) Modifying datasets: **pmsdata:Bnnn_m5procpcasp** b) Dataset: **mfddata:Bnnn_mfdX** c) New dataset: **mfddata:Bnnn_mfdY** d) Parameter description file: *leave blank to use default*		**X = B** **Y = X+1 = C**
5) CHECKS	Y	
Are PCASP and JW peaks synchronous? *In flight_plot, parameters* *JW LWC para 535* *PCASP conc para 1550*		**Merged OK?**

Flight Manager's Instrument Status Log

Flight No. **B** 251 Date: November 2006

Instrument	Fitted	Operated	Instrument	Fitted	Operated
Navigation			**Cloud Physics**		
INU		**Y**	**Probes**		
XR5M GPS		**Y**	FFSSP		**Y**
Cruciform GPS		**N**	PCASP		**Y**
Satcom C		**Y**	2D-P		**Y**
Satcom H		**Y**	2D-C		Y
Thermometers			Cloudscope		
De-Iced Temp		**Y**	SID 1		**Y**
Non De-Iced		**Y**	SID 2		**Y**
Heimann		**Y**	HVPS	**N**	
Hygrometers			CIP25	**N**	
G. Eastern		**Y**	CIP100	**Y**	
J. Williams		**Y**			
Nevzorov		**Y**			
TWC		**N**			
FWVS	**N**		**Racks:**		
Radiometers			INC	**N**	
Upper Clear		**Y**	CCN / CNC	**N**	
" Red		**Y**	CVI	**N**	
" Pyrgeometer		**Y**			
" JNO2	**N**		**Aerosol**		
Lower Clear		**Y**	PSAP	**Y**	**Y**
" Red		**Y**	Nephelometer	**Y**	**Y**
" Pyrgeometer	**N**	**Clear**	Filters	**Y**	**N**
" JNO2	**N**		AMS		**Y**
Large Radiometers					
TAFTS	**N**		**Others:**		
MARSS	**N**		CDP	**Y**	**N**
DEIMOS	**N**		SAW	Y	N
ARIES	**N**		NIR TDLAS	Y	N
SWS	Y	N	2BT O3		N
Chemistry			VACC		N
Ozone		Y	PEROXIDE	Y	N
SO2		N	Formaldehyde	Y	N
NOX		Y	ADA	N	N
CO		Y	CPI	N	N
ORAC	N	N	NOxy	N	
PAN	Y	N	PTRMS	N	
PERCA		N	Bag Sampling	N	
WAS		N	Tube Sampling	N	

Faults / Incidents Log

Flight No. B251
Date: 6th December 2006

Instruments

1. Cruciform GPS – u/s
2. TWC - u/s
3. 2DC – noisy
4. Mission Scientist Laptop – cursor scrolling across the screen on its own. Swapped with FM laptop. FM used Core Chemistry laptop.
5. RFC picture – date and time appear as normal at bottom of picture but text also appears at the top "510dd/myy 00:00:25."
6. AVAPS pc to SAW & CDP - no comms
7. Turb Probe – iced up AOA diff and AOSS diff at 1400 then repeatedly during flight. ICEX not applied pre-flight.
8. Rosemount Temperatures - De-Iced temperature went to +90C (NDI = -14) about 1426Z. Tried reseating DLU Temp card. DI now –12C (19,576 DRSU) but stays at that level even in profiles. NDI = +90C (41450 DRSU) but shows believable structure. Tried switch off CorCon DLU, remove card, reseat it, reconnect DI and NDI. DI = 94C, NDI = +1C and looks believable.
9. Core Chem laptop ethernet card connector intermittent – had to use pressure on ethernet cable to keep it working.
10. Flt Manager's pc – display locked up, rebooted then okay.
11. Racks – static shocks reported from Core Chem and Core Console Racks

Aircraft

1. JW fairing – small areas near sensor head breaking away. Avalon informed pre-flight.

Satcom H Calls - Nil

Pre-Flighter's Log

Date: 6/12/06 Flight No: B251 Pre-Flighter: JT

Item	√ or x	Location	Action	Comments
1		Hangar	Collect Dustbin, put on a/c	
		Aircraft Cabin		
2	✓	Core Chemistry	Gases x 3 ON	
3	✓	Cabin	All Racks Checked	
4	✓	Fwd CorCon	All reqd CBs made	
5	✓	Aft CorCon	CBs made, PCs ON	
6	✓	HORACE	Optical Disk loaded	MS COMPLETED
7	✓	HORACE	Recording data	"
8	✓	HORACE	DLU Status Checked	"
9	✓	HORACE	HORACE Status Checked	"
10	✓	Satcom H	Power LED ON	
11	✓	Nevzorov	Checked and OFF	
12	✓	GPS	Checked	
13	✓	INU	Align	MS COMPLETED
14	✓	Cameras Pictures	Checked x 4 OK	
15	✓	Core Chemistry	Instruments Checked OK	Cal gas pressure ↑ 517
16	✓	Core Chemistry	CO Flows Checked OK	
17	X	FWVS	Set up	NOT FITTED
18	✓	Video x 2	Records okay, Rewind	
19	✓	Delced Rosemount	Heater Checked / Set	
20	✓	Heimann	Calibration Checked	
21	X	TWC	ON & Checked	NOT FITTED
22	✓	GE	Balance checked	
23	✓	INU	Navigate then back to Align	
24	✓	Hubs x 4	Checked ON	
25	✓	Fwd Console	Miss. Sci Laptop CB made	& CB on Port Fwd SSP
26	✓	CNC	Butanol filled	
27	X	CGPS	Set up	NOT WORKING JC
28	✓	Miss. Sci Laptop	Checked Onboard	
	✓	NOPH		Zero OK
	✓	PSAP		CANT CONNECT

External Checks overleaf →

Pre-Flighter's Log

Item	√ or x	Location	Action	Comments
		External		
29	✓	Turb Probe	Clean if reqd, Photo taken	NO PHOTO, PORTS CLEAR & CLEAN
30	✓	JW	Cleaned & Checked	FRONT FIXING FALLING APART
31	✓	DI Rosemount	Cleaned & Checked	
32	✓	NDI Rosemount	Cleaned & Checked	
33	✓	Nevzorov	Cleaned/windings checked	VANE LOOKS FINE
34	✓	GE	Cleaned & Checked	
35	✓	Lower BBRs	Domes cleaned/checked	SPOT IN DOME OF CLEAR SUGGEST CHANGE
36	✓	Camera Windows	Cleaned	
37	✓	Heimann	Lens checked OK	DIRT ON LENS, SUGGEST CLEAN
38	✗	TWC Cover	Fitted if required	NOT FITTED
39	✗	All other covers	Removed	NOT FITTED
40		Dustbin	Returned to hangar	
41		Tools	Check ALL in Toolkit	
42		Tools	Avalon informed	
		Avalon Checks		Signed
43	✓	Upper BBRs Checked & Cleaned		
44	✗	ICEX applied		N/A
45	✓	Traps empty (weekly only)		

MISSING LOG SHEETS:

The following log sheets are not available for flight B251:

Log	Reason
Core Chemistry	No In Flight log (except in cases of instrument problems)

Document control

Revision	Date	Author	Comments
r0	17 Dec 2006	Doug Anderson	Initial version missing the above noted logs
r1			
r2			

VIDEO RECORDINGS:

3 x Forward Facing Cameras
3 x Rearward Facing Cameras

Digital8 video recordings from this flight reside with :

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